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10/806,459	03/23/2004	Sergey Zhidkov	2557-000175/US	1227

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EXAMINER

TSE, YOUNG TOI

ART UNIT	PAPER NUMBER
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2611

MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/806,459	Applicant(s) ZHIDKOV, SERGEY	
	Examiner YOUNG T. TSE	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20-23, 25, 30, 32 and 34-38 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8, 15, 18, 19, 26, 27, 39-43 and 45-48 is/are rejected.
- 7) ☒ Claim(s) 3-6, 9-17, 24, 26, 28, 29, 31, 33, 39-42, 47 and 48 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20090128</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on January 28, 2009 have been fully considered but they are not persuasive.

Applicant argues that channel estimate unit 54 of Belotserkovsky II does not appear to estimate impulse noise. Instead, channel estimate unit 54 of Belotserkovsky II appears to "invert the equalizer tap values to form an estimate of the channel frequency response". Belotserkovslw II, c. 3/11. 58-61 (emphasis added). And because channel estimate unit 54 of Belotserkovsky II does not appear to estimate impulse noise, Belotserkovsky II also does not appear to disclose removing a portion of the noise from the equalized signal as a function of the estimated impulse noise.

The examiner respectfully disagrees, although Belotserkovsky II does not explicitly show, teach, or suggest that the channel estimator 54 to estimate impulse noise, it appears well known to a skill artisan that a channel estimator is capable of estimating impulse response of noise, such as white noise generate in a transmission channel. As shown in Figure 4, even the channel estimator 54 itself does not estimate impulse noise, the optional noise reduction circuit 56 removes a portion of the noise from the channel estimator 54 as a function of an estimated impulse noise, which would also be estimated, for example, by the IFFT 58, the peak detector 60, and the FFT

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window adjustment 62 which generate the estimated impulse noise to the noise reduction circuit 56 through the FFT 46, the tap computation circuit 50 and the channel estimator 54. See Figure 3 of the instant application wherein the impulse noise estimating unit 310 is comprised of an IFFT 322, a peaks detection circuit 326, and a FFT 328.

Information Disclosure Statement

2. Three documents cited in the information disclosure statement filed on January 28, 2009 are duplicated of the same documents filed on September 28, 2005 and August 12, 2005 and had been considered by the examiner.

Priority/Oath/Declaration

3. Receipt is acknowledged (filed on July 08, 2004) of papers filed under 35 U.S.C. 119 (a)-(d) based on an application filed in Korea on July 22, 2003. Applicant has not complied with the requirements of 37 CFR 1.63(c), since the oath, declaration or application data sheet does not acknowledge the filing of any foreign application. A new oath, declaration or application data sheet is required in the body of which the present application should be identified by application number and filing date. Applicant fails to address this matter as pointed out in paragraph 2 of the last Office Action.

Drawings

4. The drawings were received on January 28, 2009. These drawings are acceptable.

Claim Objections

5. Claim 11 is objected to because of the following informalities: claim 11, line 2, “comprises” should be “further comprises” since the precedent claim 9 once recites “wherein estimating the impulse noise comprises”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

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7. Claims 1-4, 6, 18-19, and 46-48 are rejected under 35 U.S.C. 102(e) as being anticipated by Belotserkovsky et al. (U.S. Patent No. 6,771,591, hereinafter “Belotserkovsky”).

Belotserkovsky discloses an FFT window synchronization and equalizer tap initialization system 40 in Figures 4 and 5 comprising at least FFT transformers 46 and 48, a memory 52, a preliminary frequency-domain tap computation circuit 50, a channel estimator 54, noise reduction circuits 56, 64, an IFFT transformer 58, a peak detector 60, and an FFT window adjustment circuit 62. Also see col. 3, line 13 to col. 4, line 15.

Regarding claim 1, the FFT window synchronization and equalizer tap initialization system 40 is implemented in an OFDM receiver for reducing noise in a multiple carrier modulated (MCM) signal that has been equalized, for example, by the preliminary frequency-domain tap computation circuit 50 to compute preliminary frequency-domain equalizer tap values using a training symbol stored in the memory 52 (col. 3, lines 50-53). The FFT window synchronization and equalizer tap initialization system 40 performs the functions of estimating impulse noise in the equalized signal by the channel estimator 54; and removing a portion of the noise from the equalized signal by the noise reduction circuit 56 as a function of the estimated impulse noise generated by the channel estimator 54.

Regarding claim 2, clearly, the MCM signal is an orthogonal frequency-division multiplexing (OFDM) signal.

Regarding claim 3, wherein removing the portion of the noise also removes the portion of the noise from the equalized signal as a function of an estimated channel transfer function from the channel estimator 54.

Regarding claim 4, wherein at least part of removing the portion of the noise takes place in a frequency domain generated from the FFT transformer 46.

Regarding claim 6, removing the portion of the noise by the noise reducing circuit 56 shown in Figure 4 takes place in a time domain of the IFFT 58 which fed back the time domain back to the noise reduction circuit 56.

Regarding claims 18 and 19, although Belotserkovsky does not explicitly show or teach the OFDM receiver including the FFT window synchronization and equalizer tap initialization system 40 further comprises a clipping circuit, prior to equalizing the MCM signal, peaks above a threshold and clips the MCM signal to either a threshold level or to zero, it is well known to a skilled person in a communications receiver as admitted by Applicants in the Admitted Prior Art Figure 1, for example, in order to provide a clipping circuit prior Belotserkovsky's FFT transformer 46 of the FFT window synchronization and equalizer tap initialization system 40 prior the noise reduction by the noise reduction circuits 56 and/or 64.

Regarding claim 46, the FFT window synchronization and equalizer tap initialization system 40 is implemented in an OFDM receiver for reducing noise in a multiple carrier modulated (MCM) signal that has been partially equalized, for example, by the preliminary frequency-domain tap computation circuit 50 to compute preliminary frequency-domain equalizer tap values using a training symbol stored in the memory 52

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(col. 3, lines 50-53). The FFT window synchronization and equalizer tap initialization system 40 performs the functions of estimating impulse noise based on the partially-equalized signal by the channel estimator 54; and removing a portion of the noise in the received MCM signal in a time domain, for example, generated by the IFFT transformer 58, as a function of the estimated impulse noise generated by the channel estimator 54.

Regarding claim 47, wherein removing the portion of the noise in the received MCM signal produces a time-domain compensated signal, for instance, by the peak detector 60 and/or the noise reduction circuits 64, and further comprises equalizing a frequency-domain version of the time-domain compensated signal by the downstream equalizer 72.

Regarding claim 48, wherein equalizing the frequency-domain version of the time-domain compensated signal equalizes as a function of an estimated channel transfer function generated by the channel estimator 54.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 43 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belotserkovsky in view of Ghosh (U.S. Patent No. 5,802,117).

Belotserkovsky discloses an FFT window synchronization and equalizer tap initialization system 40 in Figures 4 and 5 comprising at least FFT transformers 46 and 48, a memory 52, a preliminary frequency-domain tap computation circuit 50, a channel estimator 54, noise reduction circuits 56, 64, an IFFT transformer 58, a peak detector 60, and an FFT window adjustment circuit 62. Also see col. 3, line 13 to col. 4, line 15.

Regarding claim 43, the FFT window synchronization and equalizer tap initialization system 40 is implemented in an OFDM receiver for reducing noise in a multiple carrier modulated (MCM) signal that has been equalized, for example, by the preliminary frequency-domain tap computation circuit 50 to compute preliminary frequency-domain equalizer tap values using a training symbol stored in the memory 52 (col. 3, lines 50-53). The FFT window synchronization and equalizer tap initialization system 40 comprises a combined fast Fourier transform (FFT) 46, equalization 50, and impulse-noise-compensation unit, which may include the channel estimator 54, the noise reduction circuit 56, the IFFT transformer 58, the peak detector 60, the FFT window adjustment circuit 62, and the block elements of Figure 5 operable on a received OFDM signal. Belotserkovsky does not explicitly show or teach the receiver front end of the OFDM receiver comprising: a down-converter; an analog-to-digital converter configured to digitize output of the down-converter; and a guard-interval removing unit operable on the digitized output of the down-converter; and the combined fast Fourier transform (FFT), equalization, and impulse-noise-compensation unit operable on a signal from the guard-interval removing unit.

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Ghosh also discloses an OFDM receiver shown in Figure 1 for receiving multicarrier modulation (MCM) signal, the OFDM receiver comprises a receiver front end which may include the an analog-to-digital converter 11 and the a guard-interval removing unit 14 operable on the digitized output of the down-converter 11 prior the FFT transformer 20 and the equalizer 22. Although the OFDM receiver does not include a down-converter prior the A/D converter 11, it is well known to a skilled artisan to known that a down-converter is need prior the A/D converter 11 for down converting a radio signal from a receiver antenna to an intermediate signal before the A/D converter 11 for converting an analog signal of the intermediate signal into digital signal.

Therefore, it would have been obvious to one of ordinary skill in the art to include a receiver front end prior Belotserkovsky's FFT window synchronization and equalizer tap initialization system 40 to include a down-converter, an analog-to-digital converter configured to digitize output of the down-converter, and a guard-interval removing unit operable on the digitized output of the down-converter as taught by Ghosh in order for Belotserkovsky's combined fast Fourier transform (FFT), equalization, and impulse-noise-compensation unit of the FFT window synchronization and equalizer tap initialization system 40 operable on a signal from a guard-interval removing unit.

Regarding claim 45, clearly, the MCM signal is an orthogonal frequency-division multiplexing (OFDM) signal.

Allowable Subject Matter

10. Claims 20-23, 25, 30, 32 and 34-38 are allowed.
11. Claims 24, 28-29, 31 and 33 would be allowable if rewritten or amended to overcome the objections set forth in this Office action.
12. Claims 5 and 9-17 would be allowable if rewritten to overcome the objections set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.
13. Claim 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.
14. Claim 44 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YOUNG T. TSE whose telephone number is 571- 272-3051. The examiner can normally be reached on Monday-Friday 10:00-6:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on 571- 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/YOUNG T. TSE/
Primary Examiner, Art Unit 2611